BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

When an operation mode is a foot air outlet mode, outside air is blown out from a defroster air outlet (7) through an upper side duct (A), and inside air is blown out from a foot air outlet (9) through a lower side duct (B). Further, air mixing dampers (4) and (5) are operatively linked with each other by a temperature adjustment lever (41) in the foot air outlet mode.

⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭62－29411

⑤Int.Cl.⁴	識別記号	庁内整理番号	㊸公開　昭和62年(1987)2月7日
B 60 H 1/00	102	A－7153－3L F－7153－3L G－7153－3L	審査請求　未請求　発明の数 1　(全11頁)

㊹発明の名称　自動車用空気調和装置

㉑特　願　昭60－169358

㉒出　願　昭60(1985)7月31日

㉓発明者　田中　尚　刈谷市昭和町1丁目1番地　日本電装株式会社内

㉓発明者　本田　伸　刈谷市昭和町1丁目1番地　日本電装株式会社内

㉓発明者　赤池　茂　刈谷市昭和町1丁目1番地　日本電装株式会社内

㉑出願人　日本電装株式会社　刈谷市昭和町1丁目1番地

㉔代理人　弁理士　石黒　健二

明　細　書

1．発明の名称

自動車用空気調和装置

2．特許請求の範囲

1)空気の取入口と吹出口を備えたケーシングと、該ケーシング内を空気の流れ方向に2分割するための仕切壁と、該仕切壁によって形成された車室内上部空間の空調用上側ダクトおよび車室内下部空間の空調用下側ダクトと、前記空気取入口に接続されている内外気切替箱を備えたブロワとを備える自動車用空気調和装置において、

前記ブロワは、その吸気口と吹出口との間に外気流通域と内気流通域を分別させるための内外気仕切手段を有し、その外気吹出域を前記上側空調用ダクトに連接させ、内気吹出域を前記下側空調用ダクトに連接させると共に、前記ケーシング仕切壁の上流側端に前記上・下両空調用ダクトの各空気取入口を選択的に開閉させるためのダクト入口ダンパを設けたことを特徴とする自動車用空気調和装置。

2)前記ブロワの内外気仕切手段は、該ブロワの吸気口に設けられた吸気域の2分割用区画板であることを特徴とする特許請求の範囲第1項記載の自動車用空気調和装置。

3)前記ブロワの内外気仕切手段は、該ブロワのスクロール部に内蔵させた風路仕切板であることを特徴とする特許請求の範囲第1項記載の自動車用空気調和装置。

4)前記ダクト入口ダンパは、前記下側空調用ダクトの空気取入口を全閉させられると共に、前記上側空調用ダクトの空気取入口を全閉させるに足りない有効面積を有することを特徴とする特許請求の範囲第1項または第2項記載の自動車用空気調和装置。

5)前記ブロワは、羽根補強用中間リングを兼ねるボス部によって吸気域を羽根の回転軸方向に2

分割させた２段貫型多翼羽根車と、スクロール部内を前記回転軸方向に２分割すると共に前記ボス部分を通過させるための中心穴を有する仕切板を設けたブロワケーシングと、該２分割されたブロワケーシングの各々に設けられた吸気口と吹出口とを備えてなり、前記ボス部分の外径が前記多翼ファンの最大外径にほぼ等しいことを特徴とする特許請求の範囲第１項または第３項記載の自動車用空気調和装置。

３．発明の詳細な説明

〔産業上の利用分野〕

本発明は車室内の上部空間と下部空間とを各々独立的に空調制御させるために２つの空調用ダクトを組合せた型式の自動車用空気調和装置に関する。

〔従来の技術〕

居住空間の好ましい暖房の仕方として、居室内の下層部分は充分に温め、上層部分はなるべく低い温度に保つ、いわゆる頭寒足熱暖房方式がより快適な温暖感を与え、また暖房用熱エネルギーの節約にもつながるものとして推賞されている。昨今では自動車用空調装置にもこのような考え方が取り入れられて車室内の上部空間専用の空調用ダクトと下部空間専用の空調用ダクトの２つを合体させたごとき構成を備えた装置が開発されている。

そして開発当初のこの種のいわば２連ダクト式の空調装置は、被空調空気としての外気または内気の導入用の１基のブロワを両ダクトで共用させていたので、暖房中にガラスの曇り止めのために低温度の外気を導入すると、車室内の下部空間にも外気を加熱した、十分昇温していない温風が吹出すことになり、かつせっかく温められた暖気が換気口から車外に排出されてしまうために、ディーゼルエンジンや高効率ガソリンエンジンを搭載した車のように暖房用熱源としてのエンジン冷却水温があまり上昇しない車種にあっては、厳寒季に温暖感が不足がちとなり、またエネルギー効率の面からも不利を招いていた。対応策として、例えば「特開昭60－8105」にみられるように２連式空調用ダクトの各々に内外気の選択吸入手段を備えた各専用ブロワを付設する方法が提案されている。

〔発明が解決しようとする問題点〕

上記のごとく２連式空調用ダクトの各々に専用ブロワを付設する方法は、外気を導入する換気またはデフロスト作動時の温暖感低下やエネルギーの浪費が防がれる点において有効ではあるが、反面装置の大型化やコストアップを招くことになり、空調用ダクトは一般に運転席計器盤の下部に設置される所から、ただでさえ狭い車室内の有効使用スペースが更に狭くなる。また換気を伴わない内気循環作動モードのもとでクーラーの除湿機能を働かせるのも勿論ガラスの曇り止め対策となるが、外気温が 0℃を下廻ると冷凍サイクルの低圧カットスイッチが作動してこの機能が生かされないし、省エネ上も不利となる。

本発明は唯一基のブロワを両ダクトが共用する型式の従来の２連式空調装置に大巾な設計変更を加えることなく窓ガラスの曇り発生を伴わずに車室内の急速暖房を行うことができ、また外気導入状態のもとでも温暖感の不足をきたしたり熱エネルギーが無益に失われたりすることのない自動車用空気調和装置を提供することを目的とする。

〔問題点を解決するための手段〕

上記の目的を達成するために本発明の自動車用空気調和装置は、空気の取入口と吹出口を備えたケーシングと、該ケーシング内を空気の流れ方向に２分割するための仕切壁と、該仕切壁によって形成された車室内上部空間の空調用上側ダクトおよび車室内下部空間の空調用下側ダクトと、前記空気取入口に接続されている内外気切替箱を備えたブロワとを備える自動車用空気調和装置において、前記ブロワは、その吸入口と吹出口との間に外気流通域と内気流通域を分別させるための内外気仕切手段を有し、その外気吹出域を前記上側空調用ダクトに連接させ、内気吹出域を前記下側空

調用ダクトに連接させると共に、前記ケーシング仕切壁の上流側端に前記上・下両空調用ダクトの各空気取入口を選択的に開閉させるためのダクト入口ダンパを設ける構成を採用した。

〔作用〕

上記のごとき構成を備えた本発明装置は、ガラスの曇り止めのためあるいは換気のために内外気切替箱のダンパを操作して外気導入モードにセットさせると、このダンパの動きに連動してダクト入口ダンパがブロワの外気吹出域と下側空調用ダクトの空気取入口との連接状態を断つ位置にもたらされるので、ブロワによって吸入された外気はその供給を必要とする車室内上部空調用の上側空調用ダクトのみに供給され、不必要な下側空調用ダクトへの供給が断たれる。

〔実施例〕

以下に付図に示す実施例に基づいて本発明の具体的構成を説明する。

1は空調装置のケーシングとしてのダクト本体であって、硬質合成樹脂などで作られておりほぼ短円形状を備えており、1aはダクト本体1 の空気取入口である。 2は冷房用熱交換器としてのエバポレータであって、エンジンルーム内に設置されている冷凍機から冷媒の循環供給を受ける。 3は暖房用熱交換器としてのヒータコアであって、自動車のエンジンから配管17と18を通じて冷却温水の循環供給をうける。16は温水供給制御用電磁弁である。

6aと6bはそれぞれダクト本体1 の内部を上側空調用ダクトAと下側空調用ダクトBの2つの並列されたダクトに分割するための仕切壁であって、ヒータコア3 の介在によって前後2部分に分けへだてられている。そして2つの空調用ダクトAおよびBには、第2図のダクトの部分的断面図を参照すれば容易に理解されるように、空気取入口1aから流入した被空調空気をヒータコア3 を通り抜けさせずに直接吹出口に向かわせるための冷風バイパス通路dの開度を調節し、また必要によりヒータコア3 への空気流入を遮断してその機能を失わせることによって両ダクトのそれぞれの吹出温度を調節させるためのエアミックスダンパ4 または5 がヒータコア3 の上流側に設けられている。1bは上側空調用ダクトAの、また1cは下側空調用ダクトBの空気取入口である。

ダクト本体1 の吹出口にはデフロスト吹出口7 、フェイス吹出口8 およびフット吹出口9 が開口している。11はデフロスト吹出口7 の開閉用デフダンパであって、吹出口7 の開口面積より幾分小さく作られているので全閉時にも幾分かの空気吹出しを許容する。12はフェイス吹出口8 またはデフロスト吹出口7 の選択的開閉用のベントダンパ、10は仕切壁6bに設けられた上・下空調用ダクトAおよびB内で調整された空調済み空気の相互流通用連通口であり、13はこの連通口10とフット吹出口9 とを選択的に開閉させることのできるヒートダンパであり、8aと9aはそれぞれ吹出口延長用ダクトの先端に設けられたフェイス吹出グリルとフット吹出グリルである。

一方ダクト本体1 の空気取入口側には、ダクトケーシング内の仕切壁6aの上流側端に、上・下両空調用ダクトAとBのそれぞれの空気入口を選択的に開閉させるためのダクト入口ダンパ25が設けられている。なお第1図ではダンパ25は空気流の上流側に向けて上下方向に回転動するように描かれているが、下流側に向けて回動するように設置してもよい。

20は被空調空気をダクト本体1 に導入するためのブロワのハウジングであって、その吹出口24がダクト本体1 の空気取入口1aに接合されている。

30はブロワハウジング20の吸気口21に接続された内外気切替箱であって、外気導入口31と内気導入口32を備えており、短筒状をなすこの切替箱30には外気導入口31または内気導入口32を選択的に開閉させるための筒状の弁体33が回転可能に挿嵌されている。34は弁体33の弁孔、35は弁孔34を外気流入域34a と内気流入域34b に分割させるため

に弁体33に組付けられた、内外気仕切手段としての区画板である。

第３図は本発明による自動車用空気調和装置の制御用パネルの正面図であって、このパネルは通常運転席計器盤に取付けられる。40はパネルの盤体、41は上側空調用ダクトＡと下側空調用ダクトＢとの各々の吹出空気温度調節用エアミックスダンパ4 と5 を、リンク機構を介して所定の連動関係を保たせながら回動させるための、上・下連動用温度調節レバー、42はエアミックスダンパ4 と5 をそれぞれ個別的に回動させるための上側温度調節用レバーであって、後述するごとくバイレベル空調モードの設定時に作動し、この時レバー41は下側温度調節用レバーとして働く。43は空調モード切替レバーであって、その移動用ガイド溝43ａに沿って移動させることによって図の左から右に向けて順次デフロスト(DEF) 、フェイス(VENT)、バイレベル（上／下）およびフット(HEAT)の４つの空調モードを実現させることができる。切替レバー43を各空調モード位置に移動させる毎に、ダクト本体1 の吹出口7 、8 、9 に設けられている前記の吹出口ダンパ11、12、13および入口ダンパ25の開閉状態が、これらのダンパ群を結ぶリンク機構の働きによってそれぞれ特定の組合せ（後述の表１参照）に切替られる。そして２つのエアミックスダンパ4 と5 はこのようなリンクの働きを介してバイレベル空調モードの際に限って前述のごとき個別的回動が可能となり、他の空調モード時には連動関係に置かれる。

44はブロワの回転数切換用レバーであって、この実施例では低(Lo)、中(Mi)および高(Hi)の３段階に切替えられる。45は内外気切替箱30の弁体33を回動させる内外気切替レバーであり、内気導入（REC)と外気導入（FRE)およびそれらの中間位置をとりうる。

バイレベル空調モード時において、弁体33をこの中間位置に回動させた時、内気と外気の混合が幅力避けられて上側空調用ダクトＡには外気のみが、また下側空調用ダクトＢには内気のみが送り込まれるためには、弁体33に取付けられている区画板35の回動位置が問題になるが、実験的に確認したところによると、第１図において区画板35がブロワケーシングのノーズ部28と弁体33の回転の中心とを結ぶ線上に、つまり図中にｃで示された位置を占めた時、上・下両空調用ダクトＡとＢへの内気と外気の隔絶的分配がより確実に行われる。

46は冷房用冷凍機の冷媒圧縮機の作動をオン～オフさせるためのエアコンスイッチである。図中に小文字ａを付した符号はそれぞれ対応する符号をつけられたレバーのガイド溝である。

第４図は第１図に示されたブロワの側断面図、第５図は第４図の（ロ）－（ロ）断面図、第６図は第１図のブロワの斜視図およびこのブロワに組付けられた内外気切替箱の分解図である。図中の23はブロワファン、25はダクト本体1 の内部仕切壁6aの空気取入口側端に取付けたダクト入口ダンパであって、ブロワの吹出口24から（図中で）上側の外気吹出域24a と下側の内気吹出域24b とに分別されて吹出されてくる被空調空気が、それぞれ上側空調用ダクトＡまたは下側空調用ダクトＢに流入するのを誘導しまたは遮断するために、これら両ダクトの空気取入口を選択的に開閉させる役目を帯びている。26はブロワハウジング20のスクロール部に内蔵させた風路仕切板であって、ブロワの吸気口部に設けられている外気流入域と内気流入域の分別用区画板35の機能を補佐してブロワハウジング20内における外気と内気の流通域を更に画然と区分させる役目を果している。27はブロワモータであり、36は弁体33の回転軸、37は弁体33の組付け用ナット、38は弁体33の回動用バー、39は内外気切替箱30をブロワハウジング20に取付けるためのボルトである。図中の他の符号は前記のそれと共通している。

つぎに上記実施例図に描かれた装置の作動について、この装置の４つの空調作動モード、つまりデフロスト、フェイス、バイレベルおよびフット

の各々の吹出モードに分けて、吹出口その他のダンパの回動位置関係を一覧表としてまとめた表1を参照しながら説明する。表中の小文字のアルファベットは、第1図に記入されている各ダンパの回動位置表示マークに対応する。

表1

空調モード	各ダンパの作動（回動位置）				
	デフダンパ 11	ベントダンパ 12	ヒートダンパ 13	ダクト入口ダンパ25	エアミックスダンパ4 と5
デフロスト	a	b	b	c	連動
フェイス	a	a	b	b	連動
バイレベル	a	a	a	c	独立
フット	b	b	a	a	連動

［デフロスト吹出モード］

車室内空気よりも乾燥している外気を導入し、必要によりエバポレータ2による除湿作用を受けた後、ヒータコア3により適温に調整したうえ、デフロスト吹出口7から窓ガラスに向けて吹出させることによってガラスの曇り止めを行うモードであって、空調モード切替レバー43をDEF位置にセットし、調温操作は上・下連動用温度調節用レバー41によって行う。内外気切替レバー45はFRE位置にセットし、内外気切替箱30の弁体33は第1図中のb位置を占めることになるが、外気が汚れている場所を走行中であれば、内気導入位置aに切替えてエアコンスイッチ46を投入しエバポレータの除湿機能に依存してもよい。

［フェイス吹出モード］

常温風または冷風を主として吹出させるのに適した作動モードであって、各吹出口ダンパとダクト入口ダンパ25はそれぞれ表1に示された回動位置を占め、また両エアミックスダンパ4と5は連動関係に置かれる。もっともダクト入口ダンパ25がb位置にあることによって下側空調用ダクトB内への空気入口は遮断され、実質的には上側エアミックスダンパ4のみが働くことになるが、元来このモードに設定するのは強暖房を求めない時なので、所望吹出温度を得るのに不都合はきたさない。尚、このモード時には内外気切替レバー45を操作して内気または外気を選択的に導入できる。

［バイレベル吹出モード］

空調モードの切換レバー43を上／下マークを付した位置にセットすることによって各ダンパ間の連動用リンク機構の働きにより、各ダンパは表1に示された回動位置を占めると共に両エアミックスダンパ4と5の連動関係が解除される。そして上側空調用ダクトAの吹出温度は上側温度調節用レバー42の操作を通じて上側エアミックスダンパ4により、また下側空調用ダクトBの吹出温度は上下連動用温度調節用レバー41の動きを介して下側エアミックスダンパ5によって各々独立的に自

由に調節することができる。従って車室内の温度分布を人為的にきめ細かく自由にコントロールさせられるので、理想的な空調状態といわれるいわゆる頭寒足熱の環境を各個人毎に異なる好みに応じて強調的にまたは穏やかに生じさせることも容易に行える。この作動モードにおいては両空調用ダクトAとBが平等にその機能を果されるようにダクト入口ダンパ25は中間回動位置Cに固定される。

〔フット吹出モード〕

加温された空気が車室内の下方に向けて吹き出される暖房のための作動モードであって、各ダンパの回動位置は表1のごとくなり、両エアミックスダンパ4 と5 は連動関係に置かれる。このモードではダクト入口ダンパ25は上側空調用ダクトAを閉ざす位置を占めるが、ダンパ25はダクトAの断面積より幾分小さく作られているので、ダクトAの空気取入口は完全封鎖をまぬかれる。従ってこの空調モードのもとで内外気切替レバー45を操作してFRE 位置にセットすると、上側空調用ダクトA内には幾分かの乾燥した外気が導入され、車室内上部空間を換気による暖房エネルギーの車外への逃亡が極力押さえられた状態のもとに暖めると共に、デフロスト吹出口7 の既述のごとき残存させてある開口部から吹出された空気によって窓ガラスの曇り止め作用が有効に営まれる。一方下側空調用ダクトBから吹出される空調済空気は、窓ガラスの存在しない車室内下部空間をもっぱら循環するので曇り止め機能は求められず、むしろ幾分温度が高目であった方が体感温度が向上する所から、下側空調用ダクトBの入口はダンパ25によって外気導入が阻止され、限りある暖房用熱エネルギーが換気作用に伴って車外に持ち出される不都合を生ずることなく、極めて効果的な暖房が行われる。

本発明目的に使用されるブロワに組込まれる内外気仕切手段としては、上記実施例以外にも様々な構成が可能であるので、次にこの点について説明する。

第7図は第1図に示されたものとは異なる第2実施例としてのブロワの透視斜視図であり、第8図はこのブロワの側断面図、第9図はこのブロワに組込まれた多翼羽根車の斜視図であって、50はスクロール型のブロワハウジング、60はハウジング50内に納められた2段翼型の多翼羽根車、55はスクロール部内を羽根車60の回転軸方向に2分割する仕切板、Cはブロワハウジング50内に形成された外気と流通域、Dは同じく内気流通域、51と52はそれぞれ外気流通域Cへの吸入口と吹出口、53と54はそれぞれ内気流通域Dへの吸入口と吹出口、56はスクロール形状を備えた内気流通域Dの底壁面を構成する底板、Eはハウジング50の一部分としての内気導入部である。尚、外気吸入口51と内気吸入口53の開閉用ダンパは図示が省かれている。

多翼羽根車60は、第9図によって理解されるように円盤板形状を備えたボス65と、上・下一対の羽根植設用リング63と64との各々の間に羽根61または62群を植設したごとき形状の2段翼型をなしている。ボス65はブロワハウジング50の吸気域を多翼羽根車60の回転軸方向に2分割させる役割も兼ねており、ブロワ内空部における外気流通域と内気流通域を区切る内外気仕切手段の一構成要素をなす。66は多翼羽根車60の駆動用のブロワモータ、67はその出力軸、68は多翼羽根車60の取付用ナットである。

つぎに上記第2実施例ブロワの機能的特徴について説明する。このブロワはブロワハウジング50の外気吹出口52は空調装置のダクト本体の空気取入口1aの上側空調用ダクトA側に、また内気吹出口54を下側空調用ダクトB側に接続させて使用する。そして本発明目的からしてブロワハウジング50の外気吸入口51と内気吸入口53とからそれぞれ吸い込まれた被空調空気は、2段翼型の羽根車60によって個別的に圧縮された後、外気流通域Cと内気流通域Dとをたどって各々の吹出口52と54に

到達するまでの間に相互に混じり合うことを防ぐ必要があるので、内外気仕切手段の一半部をそれぞれ構成する多翼羽根車60のボス65の外周側端と、このボス65を遊嵌させるべくブロワハウジングの仕切板55の中心部に設けられたくり抜き穴の内周面との間に生ずる環状空隙eは、羽根車60が偏心回転などしてこの両対向面が接触する恐れを生じない限度において最小限にまで狭めなければならない。

ところで従来製作されてきた2段翼型のブロワ用多翼羽根車は、本発明のそれとは異なってボス65は羽根植設用リング63または64と一体構造をとらせることとし、羽根取付基板または羽根補強体としてのボス65の役割を代行するものとして両リング63と64の中間位置に中間リングを設ける構成を採用していた。そしてこの中間リングの外径は、多翼羽根車を合成樹脂の鋳込み成形法によって一体構造に成形する際の便を図るなどのために、羽根61および62群によって形成される羽根車の外径と同一に揃えると共に、両リング63と64は羽根車の強度向上のためにその外径を中間リングより大きく設定していた。従ってこのような形状を備えた従来の多翼羽根車を、本発明の第2実施例に示されたブロワのハウジング50内に組込もうとする場合には、ハウジング内仕切板55に設けた羽根車遊嵌穴の内径は、少なくとも上記の両リング63または64よりは大でなければならず、必然的に中間リングの外周面と仕切板55の羽根車遊嵌穴の内周面との間には、少なくとも大径のリング63（または64）と小径の中間リングの半径の半径の差に相当する比較的巾広い環状空隙が生ぜざるを得なかった。

そこで本発明の第2実施例のブロワの多翼羽根車60については、上記のごとき従来の構造の多翼羽根車の中間リングに代る役目を帯びたボス65の外径を第8図および第9図中に65a の符号を付して示されたように拡大し、羽根植設用リング63および64の外径と同一に揃えるように配慮した。そしてこの処置によってボス65の外周面と仕切板55の内周面との空隙aをブロワの組立精度上許容される極限にまで縮小させることが可能となり、所期の目的であるブロワハウジング50内における外気と内気の相互混和防止の確実を期することが可能になった。

また2段翼型の多翼羽根車60を採用すれば、各段の羽根61と62の相対的植設位置関係をずらすことによって、各羽根群の回転に伴って生ずる騒音音波の発生周期をずらさせ、両音波間の干渉現象によって騒音の音圧レベルを目立って低減させる効果を得ることも可能になる。尚、ブロワハウジング50の各吸入口および吹出口の取付構造は図示の形状に限定されることなく、必要に応じて適宜に設計変更しても一向にさしつかえない。

〔発明の効果〕

上記のごとき構成を備えた本発明装置は、上・下両空調用ダクトの空気取入口を選択的に開閉させるためのダクト入口ダンパを下側空調用ダクトを閉ざす位置に回動させたうえ、内外気切替箱を外気導入状態にセットすると、窓ガラスのある車室内上空間には上側空調用ダクト内で空気調和された乾燥した外気が吹出されて窓ガラスの曇りを防ぐことができる。

一方窓ガラスが存在せず、また湿分濃度が高い方が体感上暖かく感ずる車室内下部空間には、下側空調用ダクトによって空調された車室内空気が循環供給されるので、外気導入に随伴して起こる車室内換気孔からの暖気の放亡が防がれて、窓ガラスの曇り発生を心配することなく車室内を急速に暖めることができる。また暖房用熱エネルギーの供給能力が乏しい車種においては、デフロストや換気のために装置に外気を導入した場合に暖房不足状態に陥る不都合を解消ないしは大巾に軽減させられる。

さらに従来の上・下両空調用ダクトに各専用のブロワを付設する方法に較べて装置の外形をコンパクト化させられる。

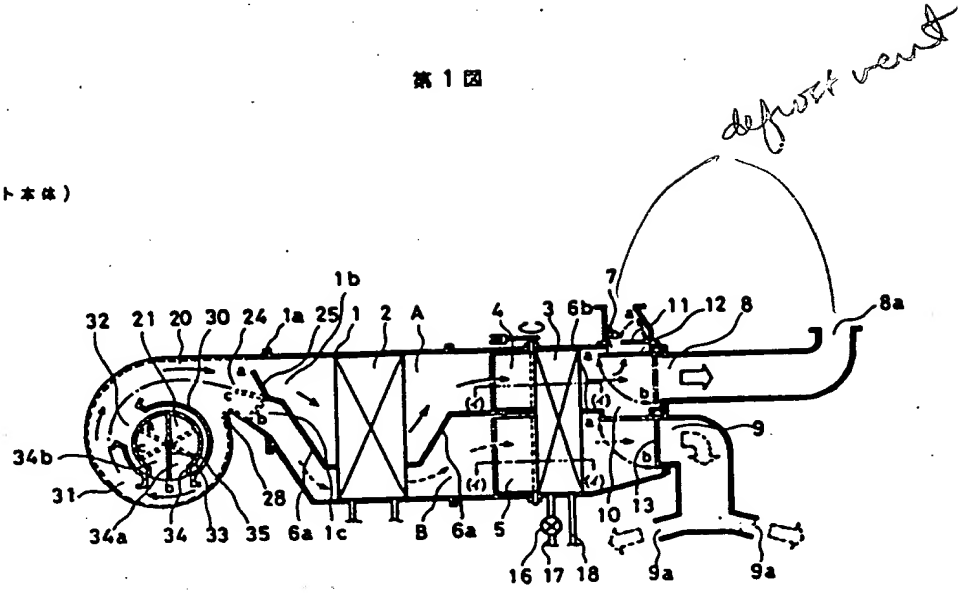
4．図面の簡単な説明

第１図は本発明による第１実施例装置の模式的側断面図、第２図は第１図の（イ）－（イ）断面図、第３図は第１図の装置内の制御用パネルの正面図、第４図は第１図の装置に組込まれたブロワの側断面図、第５図は第４図の（ロ）－（ロ）断面図、第６図は第４図および第５図に示されたブロワおよび内外気切替箱の分解斜視図、第７図は第２実施例ブロワの透視斜視図、第８図は第７図のブロワの側断面図、そして第９図は第２実施例ブロワの多翼羽根車の斜視図である。

図中　1…装置のケーシング（ダクト本体）　1b…上側空調用ダクト空気取入口　1c…下側空調用ダクト空気取入口　2…エバポレータ　3…ヒータコア　4、5…エアミックスダンパ　6a、6b…ケーシングの仕切壁　7、8、9…吹出口　20…ブロワハウジング　21…ブロワ吸気口　24…ブロワ吹出口　25…ダクト入口ダンパ　30…内外気切替箱　35…内外気仕切手段　A…上側空調用ダクト　B…下側空調用ダクト

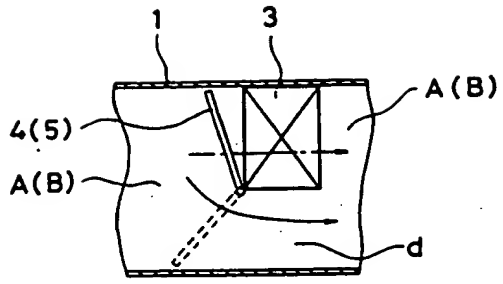
代理人　石黒健二

第１図

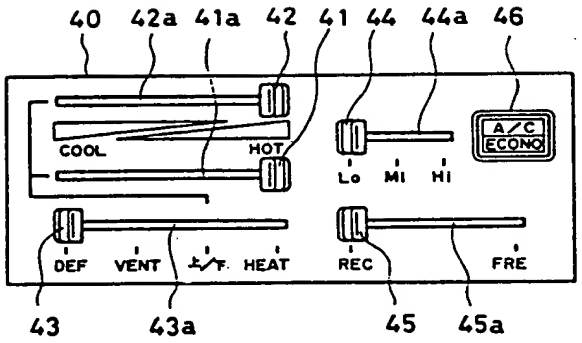


1…装置ケーシング（ダクト本体）
6a、6b…仕切壁
7、8、9…吹出口
20…ブロワハウジング
25…ダクト入口ダンパ
30…内外気切替箱
35…内外気仕切手段
A…上側空調用ダクト
B…下側空調用ダクト

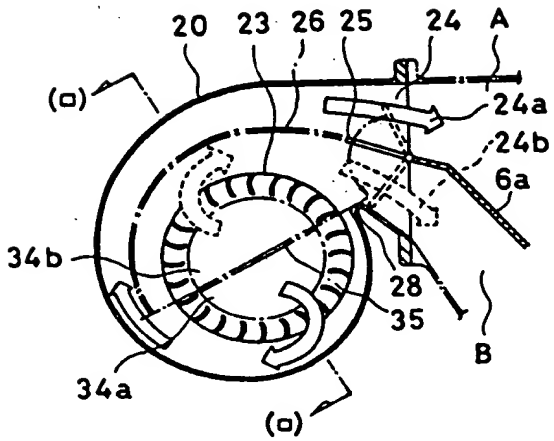
第2図



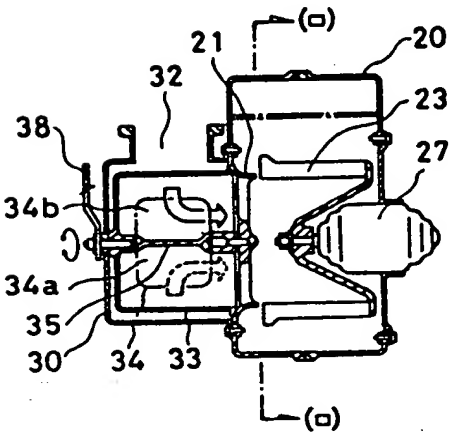
第3図



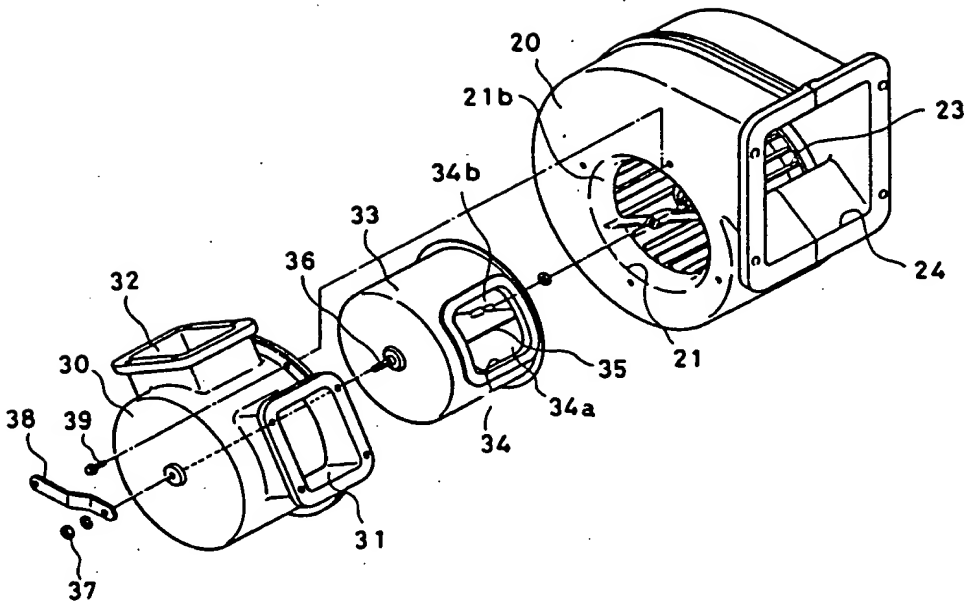
第4図



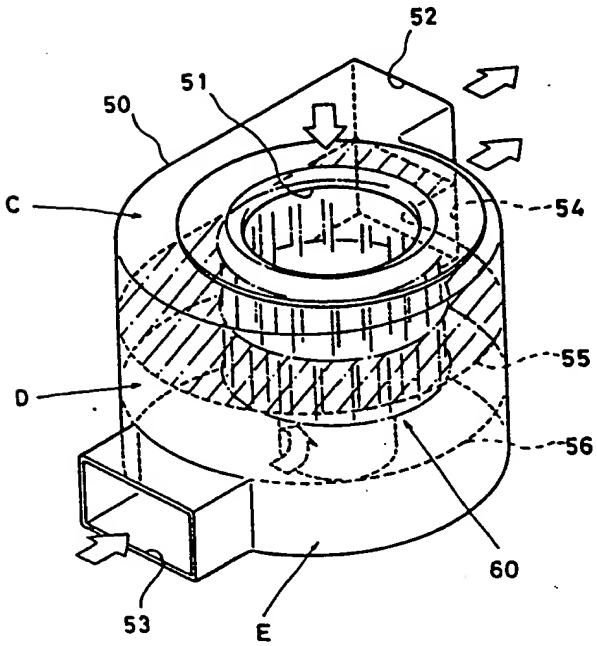
第5図



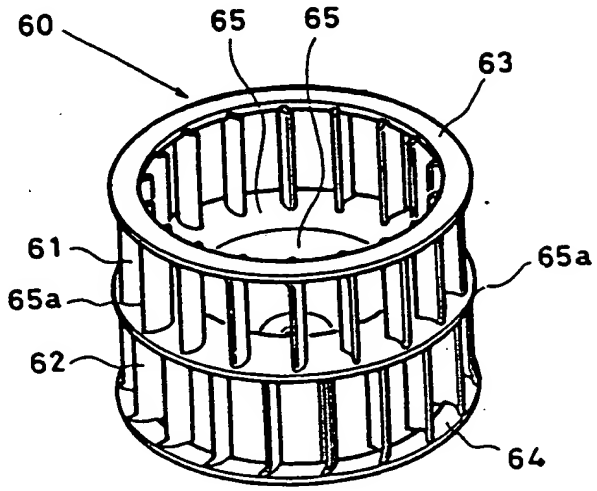
第6図


20
21b
23
34b
33
36
32
24
30
35
21
34a
38
39
34
31
37

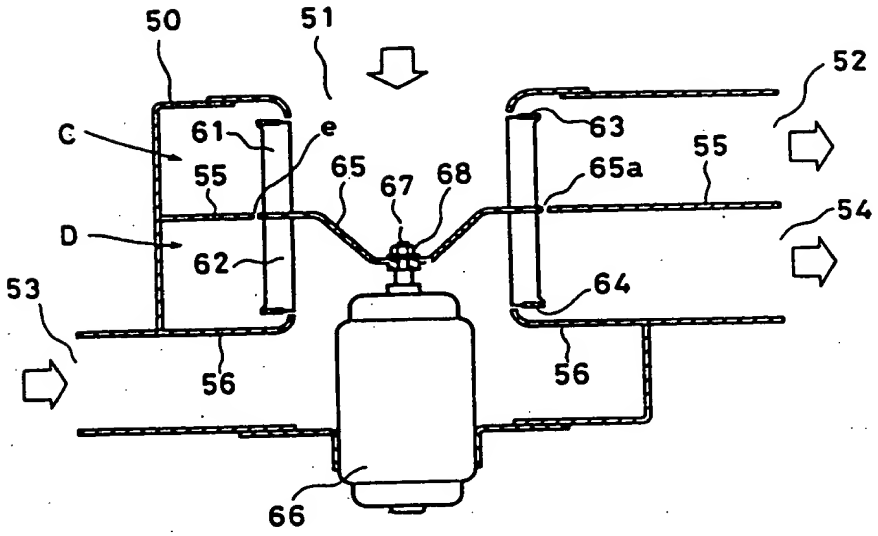
第7図


52
51
50
C
54
55
D
56
60
53
E

第9図


60
65
65
63
61
65a
65a
62
64

第8図



Laid-Open Number: 62-29411

Laid-Open Date: February 7, 1987

Application Number: 60-169358

Application Date: July 31, 1985

Applicant: Nippon Denso Co., Ltd

1. Title of the Invention

Air conditioning apparatus for vehicle

2. Claim

Claim 1. An air-conditioning apparatus for vehicle, comprising:

a casing having an air-suction port and an air-blow port,

a partition wall for partitioning an inside of the casing into two portions in an airflow direction,

an upper-side duct for air-conditioning an upper-side space of a passenger compartment, the upper-side duct being provided by the partition wall,

a lower-side duct for air-conditioning a lower-side space thereof, the lower-side duct being provided by the partition wall,

a blower having an inside/outside air switching box connected to said air-suction port, the air-conditioning apparatus is characterized in that:

said blower has inside/outside air partition means for defining an outside-air-flowing area and an inside-air-flowing area between an air-suction port and an air-blow ports thereof,

an outside-air-blowing area communicates with said upper-

side air-conditioning duct,

an inside-air-blowing area communicates with said lower-side air-conditioning duct, and

a duct-inlet dumper, for selectively opening and closing each of air-suction ports of both the upper-side/lower-side air-conditioning ducts, is provided at an upstream end of said partition wall of the casing.

Claim 2. The air-conditioning apparatus for vehicle according to claim 1 being characterized in that:

said inside/outside air partition means of the blower is a division plate for dividing an air-suction area provided in the air-suction port of the blower into two portions.

Claim 3. The air-conditioning apparatus for vehicle according to claim 1 is characterized in that:

said inside/outside air partition means of the blower is an airflow-passage-partition plate mounted in a scroll portion of the blower.

Claim 4. The air-conditioning apparatus for vehicle according to any one of claims 1 and 2 is characterized in that:

said duct-inlet dumper has an effective area which can entirely close an air-suction port of said lower-side air-conditioning duct, but which is shortage for entirely closing an air-suction port of said upper-side air-conditioning duct.

Claim 5. The air-conditioning apparatus for a vehicle according to any one of claims 1 and 3 is characterized in that:

said blower comprises a double-stage multiblade impeller whose suction area is partitioned into two portions in a direction

of a rotation axis of the impeller by a boss portion including a function of a blade-reinforcing intermediate ring, a blower casing where there is provided a partition plate which partitions an inside of the scroll-portion into two portions in the direction of the rotation axis and has a center hole into which said boss portion is loosely inserted, and a suction port and a blow port respectively provided in each of two portions into which the blower casing is partitioned, and

an outside diameter of said boss portion is approximately equal to maximum-outside diameter of said multiblade fan.

3. Detailed Description of the Invention

[Industrial Field of Application]

The present invention relates to an air conditioning apparatus for a vehicle, which combines two air-conditioning ducts in order to independently respectively air-condition both of an upper-side space and a lower-side space of a passenger compartment.

[Prior Art]

As a preferred way of heating an occupied space, a so-called head-cooling/foot-heating way is proposed. That is, as a way which provides a comfortable warm sense and improves saving-energy for heating, a lower-side portion of an occupied compartment is sufficiently heated, while an upper-side portion thereof is maintained at as low a temperature as possible. Recently, such proposition as this has been applied to an air conditioning apparatus for a vehicle, so that such as an apparatus, which combines an air-conditioning duct specialized for an upper-side space of a passenger compartment and that specialized for a lower-

side space thereof, has been developed.

At a development beginning, in this kind of the so-called twin-duct-type air-conditioning-apparatus, both ducts had shared one blower for introducing outside air and inside air to be air-conditioned. Therefore, if lower-temperature-outside air is introduced for defrosting a windshield during heating, outside air which is not sufficiently heated is also blown into a lower-side space of a passenger compartment, so that heated warm air is discharged outside a passenger compartment from a discharge port. Therefore, in such a vehicle where a diesel engine or a high-efficient gasoline engine is mounted and a temperature of engine-cooling water is not highly raised, a warm sense tends to become insufficient in a very cold season, and it is also disadvantageous from the viewpoint of energy efficiency. For example, in "JP-A-60-8105", a corresponding way is proposed. The way is that blowers, which have respectively inside/outside air-selecting suction-means, specialized for each of twin-type-air-conditioning ducts are mounted.

[Problems that the Invention is to Solve]

As described above, the way where blowers, specialized respectively for each of twin-type-air-conditioning ducts, are mounted is useful in the viewpoint of preventing warm-sense reduction and energy waste at an operation time of ventilation or defrosting when outside air is introduced. However, on the contrary, an apparatus becomes larger and its cost is increased. Further, since the air-conditioning ducts are mounted below an instrument panel of a driver's seat side, an useful space of a

passenger compartment, which is originally smaller, becomes much smaller. Windshield fogging is naturally prevented by a dehumidifying function of a cooler under an operation mode of an inside air circulation without ventilation. However, when an outside temperature becomes lower than 0℃, a lower-pressure-cut switch of a refrigeration cycle is operated, so that this function is not useful and the way is also unadvantageous in the viewpoint of saving-energy.

The object of the present invention is to provide an air-conditioning apparatus, which can heat a passenger compartment rapidly without windshield fogging, and where a warm sense does not become insufficient and heat energy is not lost uselessly even under an outside-air-suction state, while a design is not considerably changed for a conventional twin-type-air-conditioning apparatus where both ducts share only one blower.

[Means for Solving the Problems]

To achieve the above-mentioned object, an air-conditioning apparatus for a vehicle according to the present invention is constituted as follows. That is, the air-conditioning apparatus is constituted of a casing having air-suction ports and air-blow ports, a partition wall partitioning an inside of a casing into two portions in an airflow direction, an upper-side duct for air-conditioning an upper-side space of a passenger compartment provided by the partition wall, a lower-side duct for air-conditioning a lower-side space thereof provided by the partition wall and a blower having an inside/outside air switching box connected to said air-suction ports. Further, in the air-

conditioning apparatus, said blower has an inside/outside air partition means for defining an outside-air-flowing area and an inside-air-flowing area between an air-suction port and an air-blow port thereof, the outside-air-blowing area communicates with said upper-side air-conditioning duct, the inside-air-blowing area communicates with said lower-side air-conditioning duct. Further, and a duct-inlet dumper, for selectively opening and closing each air-suction port of both said upper/lower air-conditioning ducts, is provided at an upstream end of said partition wall of the casing.

[Function]

In the apparatus according to the present invention constituted as described above, if a dumper of the inside/outside air switching box is operated so as to be set to an outside-air introducing mode for preventing windshield fogging or ventilation, a duct-inlet dumper is brought to a position where a communication state is broken between the outside-air-blow area of the blower and the air-suction port of the lower-side air-conditioning duct, with being coupled to a movement of this dumper. Therefore, outside air sucked by the blower is supplied only into the upper-side air-conditioning duct where the supply is required, but is not supplied into the lower-side air-conditioning duct where the supply is not required.

[Embodiment]

Hereafter, detailed constitution according to the present invention will be described based on embodiments shown in appended drawings.

A reference numeral 1 shows a duct body as a casing, the duct body is made of a hard synthetic resin or the like and is short-tube shaped, and a reference numeral 1a shows an air-suction port of the duct body 1. A reference numeral 2 shows an evaporator as a cooling heat-exchanger, and the evaporator receives refrigerant circulated from a refrigerator. A reference numeral 3 shows a heater core as a heating heat-exchanger, and the heater core receives cooling hot-water circulated from a vehicle engine via piping 17, 18. A reference numeral 16 shows an electromagnetic valve for controlling a feed quantity of hot water.

Reference numerals 6a, 6b respectively show each of partition walls which partition an inside of the duct-body into an upper-side air-conditioning duct A and a lower-side air-conditioning duct B. The ducts A, B are respectively provided in parallel, and are respectively divided to two portions in a back-and-forth direction by intervention of the heater core 3. As easily seen with reference to a side-sectional-partial view of two ducts A, B in FIG. 2, air-mixing dumpers 4, 5 are respectively provided upstream of the heater core 3 in each of the ducts A, B. The air-mixing dumpers 4, 5 respectively adjust an open degree of each cold-air-bypass passage "d" of both the ducts and respectively adjust each blowing-air temperature thereof by stopping airflow into the heater core 3 to make its function lost as needed. The cold-air-bypass passage "d" sends the air-conditioned air sucked from the air-suction port 1a directly into the air-blow port without making the air flow through the heater core 3. A reference numeral 1b shows an air-suction port of the upper-side air-

conditioning duct A, and a reference numeral 1c shows an air-suction port of the lower-side air-conditioning duct B.

A defrost-blow port 7, a face-blow port 8 and a foot-blow port 9 are opened in a blowing port of the duct body 1. A reference numeral 11 shows a defroster dumper for opening/closing the defrost-flow port 7. Since the defroster dumper 11 is made so as to be somewhat smaller than an opening area of the blow port 7, it allows some amount of air to be blown even at a complete-close time. A reference numeral 12 shows a vent dumper for selectively opening/closing the face-blow port 8 and the defrost-blow port. A reference numeral 10 shows a communication port for mutual communication between respective portions of the air-conditioned air in the upper-side/lower-side air-conditioning ducts A, B. A reference numeral 13 shows a heat dumper which can selectively open/close this communication port 10 and the foot-blow port 9, and reference numerals 8a, 9a respectively show each of a face-blow grill and a foot-blow grill which are respectively provided at a leading edge of a blow-port-extension duct.

On the other hand, a duct-inlet dumper 25, for selectively opening/closing respective air-inlets of the upper-side/lower-side air-conditioning ducts A, B, is provided upstream of the partition wall 6a inside the duct casing, in a side of the air-suction port of the duct body 1. Further, though the dumper 25 is shown to move circularly up and down toward an airflow-upstream side in FIG. 1, it can be mounted so as to move circularly toward a downstream side.

A reference numeral 20 shows a blower housing for

introducing air to be air-conditioned into the duct body 1, and its blow port 24 is connected to the air-suction port 1a of the duct body 1.

A reference numeral 30 shows an inside/outside air switching box connected to an air-suction port 21 of the blower housing 20, and the inside/outside air switching box includes an outside-air-introducing port 31 and an inside-air-introducing port 32. A valve element 33, for selectively opening/closing the outside-air-introducing port 31 and the inside-air-introducing port 32, is inserted into this short-tube-shaped switching-box so as to move circularly. A reference numeral 34 shows a valve opening for the valve element 33, a reference numeral 35 shows a division plate as an inside/outside air switching means which are mounted in the valve body 33 so as to divide the valve opening 34 into an outside-air-inflow area 34a and an inside-air-inflow area 34b.

FIG. 3 is a front view of a control panel of an air-conditioning apparatus according to the present invention, and this panel is generally mounted on an instrument panel of a driver's seat side. A reference numeral 40 shows a panel body. A reference numeral 41 shows an upper/lower interlocking temperature-adjusting lever. The lever 41 moves circularly each of the air-mix dumpers 4, 5 of the upper-side air-conditioning duct A and the lower-side air-conditioning duct B, while it maintains a predetermined-interlocking relationship via a linkage. A reference numeral 42 shows an upper-side-temperature-adjusting lever for moving circularly each of the air-mix dumpers 4, 5 individually. When it is set to a bi-level air-conditioning mode as described later, the

lever 42 operates. At this time, the lever 41 operates as a lower-side-temperature-adjusting lever. A reference numeral 43 shows a air-conditioning-mode switching lever, and the lever 43 is moved along a moving-guide slot from the left side to the right side in the drawing, thereby realizing each of four air-conditioning modes DEFROST (DEF), FACE (VENT), BI-LEVEL (UPPER/LOWER), FOOT (HEAT) in this order. For moving the switching lever 43 to each position of air-conditioning modes, the opening/closing states of the blow-port dumpers 11, 12, 13 provided at the blow ports 7, 8, 9 of the duct body 1 and the inlet dumper 25 are respectively switched to each of specified combinations (refer to TABLE 1 described later) by an operation of a linkage linking this dumper group. Two air-mix dumpers 4, 5 can be made to individually move circularly only at the time of the bi-level air-conditioning mode via the link operation as this, and are put under the interlocking relationship at the time of other air-conditioning modes.

A reference numeral 44 shows a revolution-speed-switching lever, and the lever 44 is switched to three steps a low-level step (Lo), a middle-level step (Mi), a high-level step (Hi) in this embodiment. A reference numeral 45 shows an inside/outside air-switching lever for moving circularly the valve body 33 of the inside/outside air switching box 30, and the lever 45 can be switched to a position for introducing an inside air (REC), a position for introducing an outside air (FRE) and a middle position between them.

When the valve body 33 is moved circularly to this middle position at the time of the bi-level air-conditioning mode, only

an outside air is required to be sent into the upper-side air-conditioning duct A, and only inside air is required to be sent into the lower-side air-conditioning duct B, with avoiding mixing of inside air and outside air as little as possible. Therefore, the moving-circularly position of the division plate 35, mounted in the valve body 33, is considered to be a problem. However, according to experimental verification, in FIG. 1, when the division plate 35 is located on a line extending between a nose portion 28 of the blower casing and a center of rotation of the valve body 33, that is, at a position shown by "c" in the drawing, inside air and outside air are respectively distributed separately into each of both the upper/lower air-conditioning ducts A, B, surely.

A reference numeral 46 shows an air-conditioning switch for turning on/off a refrigerant-compressor operation of a cooling refrigerator. In the drawing, reference numerals respectively added by a small letter "a" show respectively each guide-slot for levers respectively labeled by each reference numeral corresponding to respective reference numerals respectively added by a small letter "a".

FIG. 4 is a side-sectional view of the blower shown in FIG. 1, FIG. 5 is a cross-sectional view taken along line (■)-(■) in FIG. 4, and FIG. 6 is a perspective view of the blower shown in FIG. 1 and a exploded view of the inside/outside air switching box mounted in the blower. In the drawings, a reference numeral 23 shows a blower fan, and a reference numeral 25 shows a duct-inlet dumper mounted at the air-suction-side end of the partition wall

6a inside the duct body 1. The duct-inlet dumper 25 selectively opens/closes both the upper-side air-conditioning duct A and the lower-side air-conditioning duct B, in order that two portions of air to be air-conditioned, blown separately into the upper-side outside-air blowing area 24a and the lower-side inside-air blowing area 24b from the blower blow-port 24, are respectively interrupted or introduced to flow into each of both the ducts by the duct-inlet dumper 25. A reference numeral 26 shows an airflow-passage partition plate mounted in the scroll portion of the blower hosing 20. The airflow-passage-partition plate 26 assists the function of the division plate 35 mounted in the air-suction port of the blower for division into the outside-air-inflow area and the inside-air-inflow area, and further distinctly divides the inside-air/outside-air inflow-areas inside the blower housing 20. A reference numeral 27 shows a blower motor, a reference numeral 36 shows a rotation shaft of the valve body 33, a reference numeral 37 shows a nut for mounting the valve body 33, a reference numeral 38 shows a bar for moving the valve body 33 circularly, and a reference numeral 39 shows a bolt for mounting the inside/outside air switching box 30 in the blower housing 20. Other reference numerals in the drawing are respectively common to each of those described above.

Next, the operation of the apparatus pictured in the above-described drawings will be explained with reference to TABLE 1, with being divided into four air-conditioning-operation modes, that is, the blowing modes DEFROST, FACE, BI-LEVEL, FOOT. TABLE 1 shows a list where a relationship of moving-circularly-positions of

dumpers at blow ports or other ports is summarized. Small-letter alphabets in the table respectively correspond to each mark of moving-circularly positions of dumpers filled up in FIG. 1.

[A DEFROST-blowing Mode]

This mode is as follows. Outside air, which is drier than air inside a passenger compartment, is introduced at first. Then, after the introduced outside-air is dehumidified by the evaporator 2 in case of need, it is adjusted at a suitable temperature by the heater core 3, and it is blown from the defrost-blow port 7 to a windshield, thereby preventing a windshield fogging. This mode is operated by setting the air-conditioning-mode switching lever 43 to a DEF position, and a temperature is adjusted by the upper/lower interlocking temperature-adjusting lever 41. The inside/outside air-switching lever 45 is set to a FRE position, and the valve body 33 of the inside/outside air switching box 30 is located at a "b" position shown in FIG. 1. However, when a vehicle runs on a place where outside air is polluted, the inside/outside air-switching lever 45 is set to an inside-air introducing position and the air-conditioning switch 46 is turned on, so that prevention of a windshield fogging can depend on the dehumidifying function of the evaporator.

[A FACE Blowing Mode]

This mode is an operational mode suitable for mainly blowing a cooling air, and is as follows. That is, blow-port dumpers and duct-inlet dumpers are respectively located at each moving-circularly position shown in TABLE 1, and both the air-mix dumpers are put under the interlocking relationship. Indeed, the

air-suction port, for the lower-side air-conditioning duct B, is closed by locating the duct-inlet dumper 25 at a "b" position, and only the upper-side air-conditioning duct A substantially functions. However, originally, since a time when it is set to this mode is a time when forced heating is not required, it is not inconvenient for obtaining a required-blowing-air temperature. Further, at this mode time, either of inside air and outside air is selectively introduced by operating the inside/outside air switching lever 45.

[A BI-LEVEL Mode]

The air-conditioning-mode switching lever 43 is set to a position labeled by a "upper/lower" mark. Then, by an operation of the interlocking linkage between dumpers, an interlocking relationship is canceled between both the air-mix dumpers 4, 5, while each dumper is located at each moving-circularly position shown in TABLE 1. Then, the blowing-air temperature of the upper-side air-conditioning duct A can be freely adjusted by the upper-side-air-mix dumper 4 via the operation of the upper-side-temperature-adjusting lever 42. The blowing-air temperature of the lower-side air-conditioning duct B can be also freely adjusted by the lower-side-air-mix dumper 5 via the operation of the upper/lower interlocking temperature-adjusting lever 41. Therefore, a temperature distribution of a passenger compartment can be controlled manually, minutely and freely. As a result, a so-called head-cooling/foot-heating environment, which is called as an ideal air-conditioning state, can be also easily generated emphasizingly or gently according to each of individual tastes

different from each other. In this operational mode, the duct-inlet dumper 25 is fixed to a middle-moving-circularly position "c" so that both air-conditioning ducts A, B can equally perform their functions.

[A FOOT Blowing Mode]

This is an operational mode for heating where heated air is blown into a lower side of a passenger compartment, each moving-circularly position of dumpers is as shown in TABLE 1, and both the air-mix dumpers 4, 5 are put under the interlocking relationship. In this mode, though the duct-inlet dumper is located at a position where the upper-side air-conditioning duct A is closed, the dumper 25 is made so as to be somewhat smaller than a sectional area of the duct A, thereby preventing a complete close of the air-suction port of the duct A. Therefore, in this air-conditioning mode, if the inside/outside air switching lever 45 is set to a FREE position, somewhat-dried-outside air is introduced into the upper-side air-conditioning duct A, so that a windshield fogging is effectively prevented by air blown from an above-mentioned opening remained to be open such as the defrost-blow port 7, while an upper-side space inside an passenger compartment is heated under a state where heating-energy outflow is suppressed as little as possible. On the other hand, since air-conditioned air, blown from the lower-side air-conditioning duct B, is circulated exclusively in a lower-side space inside a passenger compartment where a windshield does not exist, a function of preventing a windshield fogging is not required. Conversely, if humidity is somewhat higher, a warm sense is improved higher. Therefore, the inlet of

the lower-side air-conditioning duct B is prevented from introducing outside air by the dumper 25, so that limited-heating-thermal energy does not flow outside a vehicle by a ventilation operation, and heating is much effectively performed.

Since various constructions are possible besides the above-described embodiment as the inside/outside air switching means placed in the blower used for the object of the present invention, this viewpoint will be next explained.

FIG. 7 is a perspective view of a blower as a second embodiment different from one shown in FIG. 1, FIG. 8 is a side-sectional view of this blower, and FIG. 9 is a perspective view of a multiblade impeller placed in this blower. A reference numeral 50 shows a scroll-type blower housing, a reference numeral 60 shows a double-stage-type multiblade impeller placed in the housing 50, a reference numeral 55 shows a partition plate for partitioning the scroll-inside portion into two portions in a direction of a rotation-axis of the multiblade impeller 60, a reference letter "C" shows an outside-air-flowing area provided inside the blower housing, a reference letter "D" shows an inside-air-flowing area like "C", reference numerals 51, 52 respectively show each of a suction port for the outside-air-flowing area "C" and a blow port therefrom, reference numerals 53, 54 respectively show each of a suction port for the inside-air-flowing area "D" and a blow port therefrom, a reference numeral 56 shows a bottom plate constituting a bottom wall of the inside-air-flowing area "D" having a scroll shape, and a reference letter "E" shows an inside-air-introducing portion which is a portion of the housing 50. Further, dumpers,

for respectively opening/closing each of the outside-air-suction port 51 and the inside-air-suction port 53, are abbreviated in the drawing.

As seen from FIG.9, the multiblade impeller 60 has a double-stage multiblade type where blades a group 61, a group 62 are respectively implanted between a conical-type boss 65 and each of a pair of above/below implanting-rings 63, 64. The boss 65 also partitions the suction area of the blower housing 50 into two portions in a direction of a rotation axis of the multiblade impeller 60, and constitutes a component for partitioning the outside-air-flowing area and the inside-air-flowing area in an inside of the blower. A reference numeral 66 shows a driving-blower motor of the multiblade impeller 60, a reference numeral 67 shows its output axis, and a reference numeral 68 shows a nut for mounting the multiblade impeller 60.

Next, functional characteristics of the second embodiment described above will be explained. This blower is used so that the outside-air-blow port 52 of the blower housing 50 is connected to the upper-side air-conditioning duct A of the air-suction port 1a of the duct body, and the inside-air-blow port 54 is connected to the lower-side air-conditioning duct B. For the object of the present invention, two portions of air to be air-conditioned, sucked respectively from the outside-air-suction port 51 and the inside-air-suction port 53 of the blower housing 50, are respectively compressed by a double-stage-blade-type impeller 60. Thereafter, they are required to be prevented from being mutually mixed till they respectively reach each of the blow ports 52, 54

through each of the outside-air-flowing area "C" and the inside-air-flowing area "D". Therefore, an annular gap "e", generated between an inner-peripheral end of a mortising hole provided at the center portion of the partition plate 55 of the blower housing and a peripheral-side end of the boss 65 of the multiblade impeller 60, has to be made narrower to a minimum limit so that the boss 65 can be loosely inserted into the mortising hole. Here, the partition plate 55 and the boss 65 respectively constitute a portion of the inside/outside air switching means. However, the minimum limit has to be a level where there is no possibility of that both these opposite ends contact each other by an eccentric rotation of the impeller 60 or the like.

By the way, the double-stage-blade-type impeller, which has been recently made for a blower, is formed to integrate the boss 65 and the implanting ring 63 or 64 as different from the double-stage-blade-type impeller according to the present invention. Further construction, where an intermediate ring is provided between both the rings 63, 64 in place of the boss as a blade-mounting substrate or a blade-reinforcing body, has been adapted. An outside diameter of both the rings 63, 64 has been set to be larger than that of the intermediate ring for improving strength of an impeller, while an outside diameter of this intermediate ring has been made equal to an that of the impeller formed by blades a group 61, a group 62 for making it convenient to shape the multiblade impeller in integral construction by a casting-shaping method of a synthetic resin. Therefore, if the conventional multiblade-impeller, having such shape as this, is mounted into the

blower housing shown in the second embodiment according to the present invention, an inside diameter of a hole, to be loosely inserted into by an impeller provided in the partitioning plate 55 inside the blower housing, has to be at least larger than the outside diameter of both the rings 63, 64. As a result, it must be necessarily said that a rather-wider annular gap, at least corresponding to an radial difference between the bigger-diameter ring 63 (or 64) and that of the smaller-diameter intermediate ring, has been generated between an outside-peripheral end of the intermediate ring and an inside-peripheral end of the hole to be loosely inserted into by an impeller.

Therefore, an outside diameter of the boss 65, functioning in place of the intermediate ring of the multiblade impeller having the conventional construction described above, is enlarged in a manner as shown at a portion labeled by a reference code 65a shown in FIGS. 8, 9 in the multiblade impeller 60 of the blower of the second embodiment according to the present invention. Further, the outside diameter of the boss is considered to be made equal to that of the blade-implanting rings 63,64. Then, a gap "a" can be made smaller between the outside-peripheral end of the boss 65 and the inside-peripheral end of the partition plate 55 to a tolerance limit for mounting the blower by this disposal, thereby achieving the expected object that outside air and inside air can be surely prevented from being mixed with each other inside the blower housing 50.

Further, if the double-stage-blade-type impeller is adapted, blades 61, 62 of respective stages are shifted in a

relative-implanting location from each other, thereby shifting generating cycles of noise-sound waves generated based on the rotations of blade groups of respective stages from each other. As a result, sound-pressure level of noise can be remarkably reduced by an interference phenomenon between both the sound waves. Further, even if mounting structure of each suction port and each blow port of the blower housing 50 are designed to be changed suitably as occasion demands without being limited to the shape shown in the drawings, there can be no harm at all.

[Effect of the Invention]

In the apparatus having the above-described construction according to the present invention, when the duct-inlet dumper, for selectively opening/closing the upper-side/lower-side air-conditioning ducts, is moved circularly to the position to close the lower-side air-conditioning duct and the inside/outside air switching box is set to the outside-introducing state, air conditioned in the upper-side air-conditioning duct is blown to an upper-side space of a passenger compartment where there is a windshield dried-outside, thereby preventing windshield fogging.

On the other hand, inside air, air-conditioned in the lower-side air-conditioning duct, is circulated into an lower-side space of a passenger compartment where there is not a windshield and it can be sensed warmer under somewhat higher humidity, thereby preventing flowing out of warmed air from a ventilation port inside a passenger compartment, which is generated with accompanying outside-air introduction. Therefore, an inside of a passenger-compartment can be rapidly heated without fear of windshield-

fogging generating. Further, inconvenience, that an apparatus falls into a heating-deficiency state under outside-air introducing for the apparatus for defrosting or ventilation, can be resolved or considerably reduced in a garage which lacks supplying ability of heating thermal-energy.

Furthermore, the shape of the apparatus can be more compacted as compared with the conventional way where blowers, specialized respectively for each of both the upper-side/lower-side air-conditioning ducts, are mounted.

4. Brief Description of the drawings

FIG. 1 is a schematic-side-sectional view of a first embodiment according to the present invention, Fig. 2 is a cross-sectional view **taken along line (イ) - (イ) in FIG. 1**, FIG. 3 is a front view of a controlling panel inside the apparatus shown in FIG. 1, FIG. 4 is a side-sectional view of a blower mounted into the apparatus shown in FIG. 1, FIG. 5 is a cross-sectional view taken along line **(ロ) - (ロ)** in FIG. 4, FIG. 6 is an exploded-perspective view of the blower and an inside/outside air switching box respectively shown in FIGS. 4, 5, FIG. 7 is a perspective view of the blower of a second embodiment, FIG. 8 is a side-sectional view of the blower shown in FIG. 7, and FIG. 9 is a perspective view of a multiblade impeller of the blower of the second embodiment.

In the drawings

1 apparatus casing (duct body)

6a, 6b partition wall

7, 8, 9 blow port

20	blower housing
25	duct-inlet dumper
30	inside/outside air switching box
35	inside/outside air switching means
A	upper-side air-conditioning duct
B	lower-side air-conditioning duct

FIG. 3

43a	upper/lower

TABLE 1

air-conditioning mode	operation of each dumper (circularly moving position)				
	defrostor dumper 11	vent dumper 12	heat dumper 13	duct-inlet dumper 25	air-mix dumpers 4, 5
DEFROST	a	b	b	c	interlock
FACE	a	a	b	b	interlock
BI-LEVEL	a	a	a	c	independent
FOOT	b	b	a	a	interlock